PMC11

APPLICATION OF ZERO INFLATED POISSON MODEL FOR ESTIMATING FUNCTIONS OF COST AND EFFECTIVENESS IN COUNT DATA

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OBJECTIVES: In continuous outcome variables to be measures of effectiveness in cost effectiveness/benefit analysis, it is very straightforward to estimate functions of cost and effectiveness such as incremental cost effectiveness ratio(ICER), and incremental net benefit(INB). As well as life expectancy or survival time, primary outcome variables in many clinical trials are count data. Nevertheless, estimation or inference procedure of those data is not well explained. Especially, measures of post treatment in count data includes excessive zero due to treatment effect. In this study, we provide and compare estimation strategies for functions of cost and effectiveness which consist of counts using Poisson, negative binomial, zero inflated Poisson model(including regression model) and explore the properties of each model. **METHODS:** Point and interval estimation of ICER and INB for each model will be derived, and through the simulation study, we compare power to assess the performance in various situations. Illustrative example was presented with "Randomised, flexible dose and open study to compare the efficacy and safety of Adalat Oros with ginkgo biloba extract to treat the patients with the Raynaud's disease". **RESULTS:** On the ground of power comparison and confidence intervals of ICER and INB, ordinal modeling of count data leaded to biased estimation of ICER and INB. Compared to zero inflated Poisson model of ICER and INB, simple estimation which count data were considered continuous variable underestimated more than 1.5 times. **CONCLUSION:** The study demonstrated the estimation procedure of cost and effectiveness functions and appropriate modeling of count data prevent biased estimate of ICER or INB.

PMC12

PRICE VS ACCESS: A PROBABILISTIC MODEL FOR GUIDING PRICING DECISIONS

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OBJECTIVES: To produce a simple probabilistic model for guiding pharmaceutical pricing decisions, across multiple and various health care markets, in the presence of uncertainty regarding market-specific characteristics, access and share. **METHODS:** Pharmaceutical pricing appears to be largely determined by the price levels within a drug class or indication with less emphasis placed on cost effectiveness and budgetary impact. Health payers by contrast are increasingly using cost-effectiveness and budgetary impact measures to determine whether a product should be reimbursed at the requested price. We set out a simple system for probabilistically modelling manufacturer revenues from a product as a function of product price. The system relies on explicit modelling of the reimbursement probability as a function of price, and of market share conditional on reimbursement as a function of price. Uncertainty can be incorporated at the patient and market level. A revenue probability distribution function is derived as a function of price. **RESULTS:** For single market models, the system produces the familiar "all or nothing" results of lesser interest: lower prices equate to greater probabilities of reimbursement and market share. The system is most valuable in multi-market situations where relationships are more complex or in markets where, due to the presence of competitor products or reference pricing, the relationship with price of probability of acceptance or level of market share is complex. Results in these settings are less generalizable. We demonstrate this system in a number of illustrative single and multi-market settings. **CONCLUSION:** The revenue probability distribution function provides a useful tool to guide pharmaceutical pricing decisions, according to a company's risk profile. The model developed facilitates decisions as to when and how to trade-off reimbursement probability for revenue per patient, with the aim of maximal revenues at a global level.

PMC13

JOINT DETERMINATION OF PRICES, RESEARCH EXPENDITURE AND MARKETING EXPENDITURE BY PHARMACEUTICAL FIRMS: A THEORETICAL MODEL OF PROFIT-MAXIMIZING BEHAVIOR

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OBJECTIVES: The activities of pharmaceutical companies in developing, pricing and marketing their products continues to be controversial, and literatures exist on each subject, but very little has been published modeling their joint determination. **METHODS:** Using standard micro-economic assumptions of profit-maximization we develop a model of the decision-making process which yields an interior equilibrium, solve the model and conduct comparative statics analyses. **RESULTS:** We find strong relationships between marketing and research expenditure. Marketing and research are not substitutes, but complements. Exogenous changes in the research environment which lead to an increase in research will lead to a more than one-for-one increase in marketing. Increasing shares of pharmaceutical costs paid directly by consumers will lead to a decrease in marketing. **CONCLUSION:** Empirical studies of firm behavior may yield biased results if they do not consider the simultaneous nature of the firm's decisions.

PMC14

PREDICTORS OF SELF-RATED HEALTH STATUS AMONG GENERAL POPULATION IN THE UNITED STATES USING THE MEDICAL EXPENDITURE PANEL SURVEY (MEPS)

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OBJECTIVES: To investigate the predictors of self-rated health status for the U.S. civilian noninstitutionalized population. **METHODS:** Cross-sectional analyses using multivariate logistic regression were performed with 11,405 individuals from the 2003 MEPS. The self-rated health status was dichotomized into two categories (fair/poor health and good/very good/excellent health). Standard demographic variables were employed as predictors in the regression, and the impact of a given predictor on the self-rated health status was obtained as odds ratios. To check the presence of multicollinearity, the conditional index and variance composition were examined. **RESULTS:** Smaller family size, very low incomes (less than $15,000/year), non-white ethnicity (Hispanic, African-American, and Asian), older ages, female, lower education than college, having public health insurance, and having worse mental health status were significantly and consistently associated with fair/poor perceived health ($p < 0.05$). An additional family member and male gender were related with decreased risk of fair/poor perceived health by 0.88 and 0.87, respectively. Subjects with very low incomes, Hispanic ethnicity, and aged between 56 to 65 were associated with 1.19, 1.34, and 3.65 times more likely to rate their health as fair/poor in comparison with subjects with high incomes (more than $100,000/year), White ethnicity, and aged between 16 to 25, respectively. Similarly, persons with lower education (high school degree) and public insurance would be 1.77 and 1.75 times as